11th International Conference MMET*2006

The 11th International Conference on Mathematical Methods in Electromagnetic Theory (MMET*06) was organized at the Kharkiv National University, Kharkiv, Ukraine (Figure 1), June 26-29, 2006. The primary organizer and sponsor of the conference, as for all MMET-series conferences since 1996, was the IEEE AP-S East Ukraine Joint Chapter. The Chair of the Conference was Prof. Eldar Veliev of the Institute of Radiophysics and Electronics of the National Academy of Sciences of Ukraine (IRE NASU), who was also the Chapter Chair in 2006. The Technical Program Chair was Prof. Alexander I. Nosich of IRE NASU, who was the Chapter organizer in 1995. Most of the hard work of the local organization was done by the MMET secretary, Nataliya Don (a PhD student of the IRE and an AP-S Student Member), and the proceedings and Web site Editor, Dr. Artem Boriskin, also of the IRE and an AP-S member. The aim of the conference was to provide an environment for the efficient exchange of research ideas and results, and for the emergence of new friendships and international collaborations across a wide range of electromagnetic modeling techniques and applications. Another aim was to encourage and motivate the young scientists and students in the region.

Traditionally, the MMET programs are a blend of the mathematics of waves, scientific computing, and analyses of various physical effects, from surface-plasmon-enhanced light absorption to microwave antennas, and from wave scattering to radio-frequency tweaks in the atmosphere. The conference also brought the attention of the community to the hottest topics and applications of computational electromagnetics in nano-optics, metamaterials, and non-classical electrodynamics. To enhance the impact of the meeting, MMET*06 joined with LFNM'2006 (the International Conference on Laser and Fiber-Optical Networks Modeling), organized by the local LEOS Chapter, thus constituting the "Kharkiv Electromagnetics and Photonics Week." Another new feature of MMET*06 was the inclusion of around ten Ukrainian, Russian, and Georgian invited speakers and authors, who were participants of the first MMETs some 12 or 10 years ago, and then went to the West to realize their research ambitions.

Figure 1. The entrance to the Kharkiv National University, venue of MMET*06. The monument to the right is for the university initiator, early-19th-century Kharkiv landlord and educator Vasiliy Karazin.

Figure 2. At the plenary sessions of MMET*06, the attention of the audience was frequently captured by the outstanding papers presented. First row: Prof. Francisco Mesa (l) of the University of Sevilla and Prof. Giles Lifante (r) of the Autonomous University of Madrid; looking from above is Prof. Diana Skigin of the University of Buenos Aires, recipient of the MMET award for Most Distant Travel.

Figure 3. Dr. Ronan Sauleau of IETR, Rennes, France, talking about specific features of lens antennas in millimeter- and sub-millimeter-wave applications. He is also a coordinator of the European Laboratory of Lens Antennas (ELLA) network, proposed in 2007.

The MMET*06 program included more than 174 papers, including 26 invited talks. Sessions of regular contributed papers were enriched by four plenary sessions (see Figure 2), involving talks by eminent scientists in various classical and emerging areas. Monday morning was dedicated to two plenary sessions involving talks on "Surface Plasmons" by Kazuo Tanaka, on "Photonic Crystals" by Haroldo Hattori, and on "Metamaterials" by Sergei Tretyakov. In the afternoon, the more traditional areas of "High-

Frequency Modified Edge Currents," covered by Makoto Ando, and of "Lens Antennas," by Ronan Sauleau, attracted a lot of interest (Figure 3). The third plenary session, on Tuesday, was on advanced analytical-numerical techniques and their various applications, such as "Branch Points and Modal Interactions for Guided Wave Structures" by Alexander Yakovlev (Figure 4), "Analysis of Composite Textiles" by Guy Vandenbosch, "Fields in Inhomogeneous Media" by Tsuneki Yamasaki, and "Metallic Gratings" by Diana Skigin. The last of the plenary sessions was filled with talks on numerical techniques, such as by Giles Lifante on "Optical Waveguide Devices," Francisco Medina on "Mixed Potential Integral Equation," and Phillip Sewell on "TLM Meshes." Several more invited papers were presented at the regular sessions. Discussions frequently continued during the coffee and tea breaks, served in a cozy hall decorated with portraits of science celebrities (Figure 5).

In addition, on June 26 there was a half-day Young Scientist Career Development Workshop, to bridge a gap between education and careers in electromagnetics and photonics (Figure 6). It was initiated and organized by Dr. Svetlana Boriskina of the Kharkiv National University. The workshop featured tutorials taught by Prof. Sergei Tretyakov of the Helsinki University of Technology, and Dr. Vladimir Gavrilenko of the Norfolk State University. Educational movies were presented by the students of the Taurida National University, Simferopol. There were poster presentations from participating OSA/SPIE/IEEE student Chapters from Ukraine, USA, and Australia. The workshop also became a social phenomenon, which helped student participants to get to know each other, to network with their peers and mentors, and to share ideas. The winner of the Student Paper Contest, which was held in the framework of the workshop, Mr. Maxim Nesterov of IRE NASU, received a travel grant to attend the 2007 Winter College on Optics, held in Trieste, Italy, by the International Center for Theoretical Physics.

The sweetest parts of MMET*06 were the closing ceremony and banquet on the last day of the conference. The closing ceremony was both informative and entertaining. Some nostalgic talks on previous MMETs were presented by Prof. Sergei Bankov,

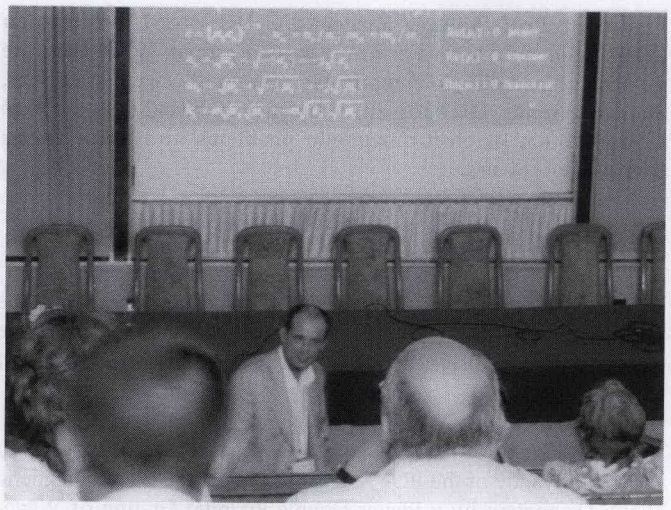

Figure 4. Prof. Alexander Yakovlev of the University of Mississippi, USA, fascinated the audience by his talk on the frequency-plane branch-point singularities for guided-mode structures, coauthored with G. Hanson. These two scientists are also known for their remarkable book on the operator theory in electromagnetics.

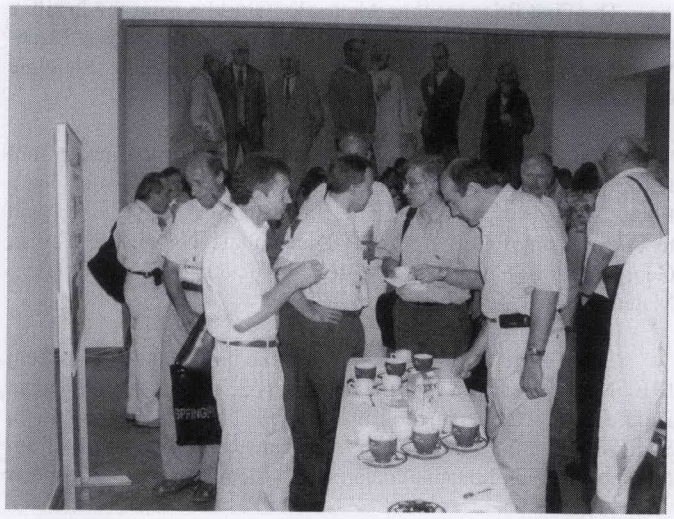

Figure 5. What can be the subject of a coffee-break chat between (l-r) Dr. Igor Ivanchenko of IRE NASU, Kharkiv, Prof. Sergei Tretyakov of the Helsinki University of Technology, Dr. Alexander Schuchinsky of the Queens University Belfast, UK, and Dr. Vladimir Veremey of the Xpedition Systems Co., San Jose? With a little error, it is metamaterials in electromagnetics.

Figure 6. Participants of the Young Scientist Career Development Workshop during MMET*06. Shown third from the left is the workshop organizer, Dr. Svetlana Boriskina.

now head of Antenna Department at the Moscow Power Institute (Technical University); Dr. Alexander Schuchinsky, now lecturer at the Queens University Belfast, Northern Ireland; and Dr. Diana Skigin of the University of Buenos Aires. I also reminded attendees of how, in 1991, we enjoyed night sessions of swimming in the warm Black Sea when MMET*91 was held in Alushta, the Crimea, only two weeks after the abortive military coup in Moscow.

The conference traditionally places huge emphasis on encouraging young scientists and students. One of the ways to do this is the MMET Prizes for Young Scientists, for the best papers and presentations. This year, the international jury, headed by Prof. Guy Vandenbosch of the Catholic University of Leuven (Figure 7), awarded the following prizes:

The First Prize went to Alexander Glushko from the Institute of Semiconductor Physics, NASU, in Kiev, for the paper "Plane-Wave Method for Out-of-Plane Propagation in 2-D Photonic Crystals."

Two Second Prizes were awarded to Grigoriy Gorbik from IRE NASU, Kharkiv, for the paper "Four-Vector Potential for a Point Charge Moving Arbitrarily in a Cylindrical Waveguide;" and to Alex Bijamov, Jr., from the Tbilisi State University, Tbilisi, Georgia, for the paper "Computer Simulation of 3-D Complex-Material-Based Devices."

Three Third Prizes were given to Maxim Ivakhnichenko from IRE NASU, Kharkiv, for the paper "Elementary Fractional Dipoles;" Dr. Kakhaber Tavzarashvili from ETHZ, Zurich, Switzerland, for the paper "Parameters Extraction from Inhomogeneous Metamaterials with Model Based Parameter Estimation" (Figure 8); and to Dr. Nikolaos Tsistas, from the University of Athens, Greece, for the paper "On Spherical Wave Scattering by an Electrically Small Layered Sphere and a Related Inverse Problem."

Figure 7. The Awards Jury Chair, Prof. Guy Vandenbosch of the Catholic University of Leuven, Belgium, and the conference Chairs, Profs. Eldar Veliev and Alexander Nosich, announcing the MMET*06 awardees at the closing ceremony.

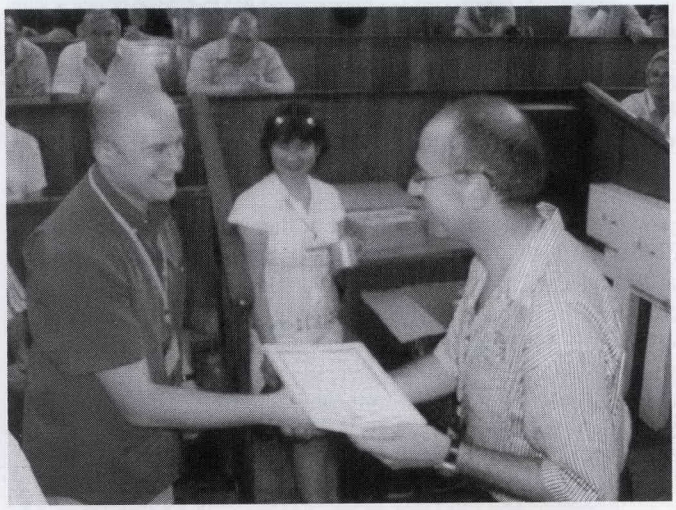

Figure 8. Guy Vandenbosch hands an award certificate to Dr. Kakhaber Tavzarashvili of the Zurich Technical University. MMET*06 Secretary, Mrs. Nataliya Don, is waiting with a tea cup bearing a MMET logo and, ...yes, Maxwell's equations.

Figure 9. Yuriy Baranhugov came to MMET*06 from Barnaul in Russia, covering over 5000 km, and not knowing that this adventure would qualify him for a Most Distant Travel Award, with an associated bottle of red Crimean sparkling wine.

Figure 10. Prof. Anatoly Kirilenko of IRE NASU received an MMET Sologub Award as a well-known expert in the accurate numerical modeling of complicated waveguide circuits, devices, and subsystems. His software is frequently based on analytical regularization of electromagnetic problems and outperforms commercial solvers.

Two "next-to-the-best" honorable mentions were awarded to Piotr Mladyonov of the IRA NASU for the paper "Electromagnetic Wave Diffraction by a Planar Double-Periodic Grating of Wave-Shaped Crossed Metal Strips," and to Yuriy Baranchugov from the Altai State University, Barnaul, Russia, for the paper "Scattering from a Rectangular Pit in Impedance Screen" (Figure 9).

Organizers also handed out two general awards of MMET, named after two prominent Kharkiv electromagneticists, to

scientists who had contributed a lot to the development of computational electromagnetics and applications, and also to the success of the MMET series of conferences. The Vladimir Sologub Prize, "For the development of analytical regularization methods," was given to Prof. Anatoly Kirilenko of IRE NASU, Kharkiv (Figure 10). The Nikolay Khizhnyak Prize, "For the contribution to electromagnetic theory," was given to Prof. Kazuo Tanaka, Gifu University, Gifu, Japan.

Besides these technical prizes, MMET*06 Honorary Certificates, with the citations "For the most distant travel to MMET*06," were handed out to two Western participants, Prof. Diana Skigin of the University of Buenos-Aires, Argentina, and Dr. Haroldo Hattori of the Australian National University in Canberra (Figure 11). Three other certificates like these were given to three Eastern participants from the Siberian part of Russia: Yuriy Baranchugov and Alexey Rykshin, both from the Altai State University in Barnaul, and Dr. Vitaly Khakhinov, from the Institute

Figure 11. Another winner of the Most Distant Travel Award, Dr. Haroldo Hattori, came from the mid-winter Canberra, where red Crimean sparkling wine is a rare commodity.

Figure 12. At the conference banquet (l-r): Alexander Glushko, winner of the fist prize of MMET*06 for the best young scientist paper and bright presentation, with the conference Web site and proceedings Editor, Dr. Artem Boriskin, and PhD student of IRE NASU, Ms. Elena Boriskina.

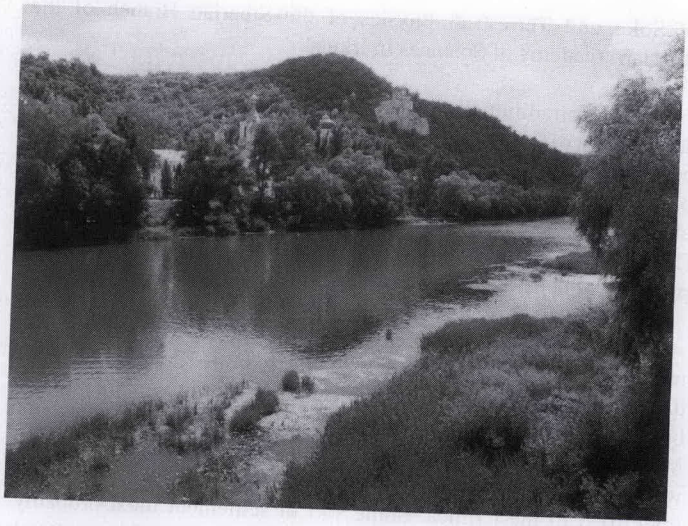

Figure 13. The Svyatogorsky Monastery on the Holy Hills looked gorgeous and not spoiled by globalization, although it now has a Web site.

Figure 14. The view from the top of Holy Hill on the forested valley of the Seversky Donets River. A white statue on the neighboring hill was erected in the early 1930s, when the monastery was closed, and commemorates one of the local revolutionary leaders.

Figure 15. After serving as a hospital in the Soviet time, a church at the Svyatogorsky complex shines in the sun again, due to the renovation finished a couple of years ago.

of Solar and Terrestrial Physics of the Siberian Branch of the Russian Academy of Sciences in Irkutsk.

Other traditional certificates were awarded for the first submission of a paper, and for the early-bird registration at the conference. Each laminated certificate was accompanied with a bottle of red Crimean Champaign. This tasty drink was also abundant at the conference banquet, causing a relaxed atmosphere (Figure 12), and pushing everybody onto the dancing floor. The presence of belly dancers was also a surprise.

There was a post-conference day tour to the Holy Hills cave monastery, about 120 km to the southeast from Kharkiv. The site dates from at least the early 16th century, when it was mentioned by S. Herberstein, envoy of the Holy Roman Empire to the Moscow Tsardom, as a chapel at the limestone cliffs near to a widely known ford across the Seversky Donets River on the old trade road to the Crimea. Some sort of settlement most probably existed there even earlier. It was unfortunate that I could not attend this trip. Fortunately, Prof. Sergei Tretyakov of the Helsinki University of Technology has kindly sent me his photos and attached the following comments.

The conference participants very much appreciated a unique social event: a bus excursion to Svyatogorsk (Holy Hills) and the Svyato-Uspenski monastery. This architectural ensemble of the 17th-19th centuries is located on picturesque rocks of the right bank of the Seversky Donets River (Figure 13), and the view from the top of the hills is truly fantastic (Figure 14). The complex has been recently declared a holy place for the Orthodox Church. The place saw many important events in the history of both Russia and the Ukraine, and it was a deeply emotional event to visit it and see the churches (Figure 15) and the miracle icons. After the sightseeing, the Western guests were taken to a local summer restaurant for a dinner. Disappointed by the absence of young local organizers – students of the IRE and IRA NASU, for whom the dinner was too pricey – we found them making a picnic at the river bank. Of course, we ate quickly and joined them there.

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